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The Acute Anxiety State

STEWART WOLF

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MONTHLY CLINICAL MONOGRAPHS ON CURRENT MEDICAL PROBLEMS

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The Acute Anxiety State

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Stewart Wolf

is Professor and Head of the Department of Medicine, University of Oklahoma School of Medicine. He received his M.D. degree from Johns Hopkins and took his resident training in Medicine at New York Hospital. From 1946 to 1952, Dr. Wolf was Associate Professor of Medicine at Cornell University Medical College. His research has been in pain, gastrointestinal physiology and psychosomatic mechanisms. He is Past President of the American Federation for Clinical Research and President-Elect of the American Psychosomatic Society.

CASE 1.—*Diaphragmatic spasm as a cause of precordial pain in a patient unaware of her anxiety.*

A 43-year-old woman, mother of two teen-age children and a boy of seven, was brought to a physician's office for emergency treatment. She was in acute distress and complained of intense pain in the lower right chest anteriorly, pain which was questionably pleuritic although associated with severe dyspnea. The pulse was 110, the respirations 20 and shallow, the blood pressure 110/70, and there was no fever. The remainder of the physical examination revealed nothing unusual except for a little tenderness in the right upper quadrant of the abdomen. She was given 0.25 Gm. of sodium amytal in 3 cc. of distilled water slowly intravenously. Within a minute her symptoms subsided completely, she was breathing comfortably, and there was no pain. This attack was one of a series that she had had at irregular intervals over the preceding 2 years. In most of those attacks, her physician had treated her by hospitalization and large doses of opiates, and with such measures the attacks subsided in approximately 2 days. She considered this latest "cure" almost miraculous. On subsequent discussion it was learned that this patient had made a precarious adjustment to her husband and his parents. Her first pregnancy had occurred during

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courtship, and because of this she felt overwhelmingly guilty. Although she and her husband had never separated during their 17 years of marriage, he had been intensely jealous and had greatly restricted her activities for fear that she might be unfaithful to him. He continually criticized her for what he considered an abnormally great sexual desire. Many of her attacks of chest pain and dyspnea had occurred on the occasion of her meeting and being attracted by a casual male acquaintance. Others had occurred when her teen-age daughter was particularly rebellious or when her husband punished their young son.

During each attack she became intensely frightened and agitated. Ultimately it was possible to demonstrate experimentally the mechanism responsible for her symptoms; and, on two occasions, attacks were induced in the laboratory while her chest was being examined fluoroscopically. On both occasions the fluoroscopic examination was made at a time when she was comfortable and free of symptoms. The diaphragm was noted to be moving normally. When the subject of her husband's restrictive attitudes was abruptly mentioned, the inspiratory movements became quick; and each time, before the diaphragm had risen to its resting level, another inspiratory movement pulled it down to full contraction. As the upward excursion was repeatedly interrupted by a quick, forceful inspiratory movement, the chest became progressively inflated. Ultimately, when tight contraction of the diaphragm had been established, desperate efforts at inspiration failed to bring a full breath of air into the chest. On the occasion of one attack, it was possible to achieve relaxation of the diaphragm by the intravenous administration of sodium amytal; and on another occasion, with strong reassurance. Each time, normal breathing was resumed and the pain and dyspnea were relieved. It was particularly significant that this patient had not been aware of any connection between her attacks and the threatening life situation. In fact, she had not been aware of any anxiety before the onset of dyspnea and pain. Over the subsequent 11 years, attacks have been infrequent, and each time she has been able to identify the pertinent precipitating circumstance.

CASE 2.—Tetany from hyperventilation in a setting of sudden danger.

A 26-year-old army sergeant was evacuated from the Leyte invasion to a general hospital during the Southwest Pacific Campaign in World War II with a history of several seizures, characterized by generalized stiffness of the body, but with unconsciousness on only one occasion. There had apparently been no tongue biting or incontinence. Most of the attacks had occurred at night or in the early morning, but it was not clear whether an attack had awakened him from sleep. The re-

mainder of the history was unremarkable, and no abnormalities were made out on physical examination. There was a minor enemy air raid during the first night after his admission to the hospital. The patients were instructed by the ward attendant to lie under their beds. They all did except the sergeant, who appeared stiff and unable to speak or to move. Examined promptly by the ward physician, he was found to be hyperventilating at nearly 70 breaths per minute. His neck and extremities were stiff, there was a positive Chvostek sign, and his fingers were in the position of tetany. The air-raid alert was over before the examination was completed, and the patient's attack was terminated by having him rebreathe in a paper bag and by encouraging him to hold his breath.

CASE 3.—Fainting followed by weakness and confusion in an anxious, frightened girl.

A 19-year-old girl, a high-school senior, was referred to the neurology clinic because of having had, over the previous 18 months, three episodes of loss of consciousness, associated with confusion and extreme weakness. Her mother said that she had been a frail girl since birth and had had several convulsions, which were associated with an attack of pneumonia at age 2. She had displayed a great deal of anxiety about going to school and had to drop out for a year at age 7 because of "St. Vitus' dance." There was no story of heart murmurs, polyarthritis or other manifestations of rheumatic fever. Paradoxically, the child's play had not been restricted and she had done quite well at sports in school. On several occasions in the classroom, however, she had had uncontrollable attacks of shaking of the extremities, which sometimes made it impossible for her to recite. The three fainting attacks which characterized the present illness had occurred at home during the evening hours. On each occasion, she had simply fallen to the floor or slumped in a chair, losing consciousness for 2 or 3 minutes, but without injury to herself and without incontinence or tongue biting. Following the attack, she was weak and confused but not actually disoriented. She had to be helped into bed, and each time she missed a day or two of school. The remainder of the history was unremarkable.

The patient was an only child of highly educated parents, both of whom served on the faculty of a small women's college. The early career of the mother had been marked by a long string of awards and recognitions for scholastic achievement, and she had assumed, incorrectly, that her daughter would make high grades in school and was greatly disappointed at the girl's failure to do so. She insisted, however, that she was not conscious of having made the girl aware of her disappointment. The girl, who was very self-possessed at first, soon wept

regularly during the interviews and told a pathetic story of her eagerness to please her mother and her fears of failure. She had wanted to become a physical education teacher but was afraid to discuss her plans with her parents. She indicated that she had learned to control her attacks of trembling with great difficulty; and she also brought out that her fainting spells had occurred on evenings before important examinations in school. She spoke with evident relief of overpowering anxiety at these times.

The patient kept in touch with her physician, and over the subsequent 14 years had no further attacks of fainting. She went on to finish high school, married a Navy flier, much to her mother's consternation, and had twin girls and a baby boy. Her husband's plane crashed during the Korean war and he was killed. Her mother died the following year of a cerebral vascular accident, and she and the children lived with her father thereafter. This arrangement has apparently been satisfactory, and the patient has remained free of symptoms.

CASE 4.—Cardiac arrhythmias with convulsive seizures on one occasion in a frightened man who concealed the source of his anxiety.

A 52-year-old bartender was brought to the emergency room of a hospital because of sudden severe substernal pain associated with palpitation, dyspnea and orthopnea. The symptoms had been present for approximately 4 hours when the patient was first seen by the physician. At that time, the patient appeared pale and weak and was perspiring profusely. His extremities were cold, and the pulses were difficult to feel. The heart rate was 150 beats per minute and appeared to be irregular. There were rales at both lung bases, but there were no other significant findings except for a blood pressure of 90/75 in both arms. An electrocardiogram revealed atrial flutter with a shifting block. The patient was rapidly digitalized. Several hours later, the rhythm was found to be atrial fibrillation. The following morning he was in normal sinus rhythm and free of complaints. An exhaustive study of this patient failed to reveal any evidence of organic heart disease. During the next 18 months he had several such attacks. Some were treated in other hospitals, where attempts to discover an underlying heart disease were also futile. With one of the episodes he had a grand mal seizure, but there were no significant neurologic findings following the attack. Lumbar puncture showed the spinal fluid to be unremarkable. An electroencephalogram made several days after his seizure was normal. Several examiners attempted to uncover personality conflicts in this patient which might have been of significance in producing the acute arrhythmias, but it was very difficult to get him to talk about himself.

Finally, through his brother it was ascertained that the patient had been questioned concerning a neighborhood crime several days before the initial attack. This investigation had apparently been suddenly terminated because of the intervention of a politically influential beer distributor. The beer distributor had thereupon attempted to induce the patient to dispense the distributor's beer exclusively. When the owner of the tavern was unwilling to make this change, our patient was "caught in the middle." The first attack had occurred when the patient was at work, and it coincided with the distributor's entering the tavern to check up on the types of beer sold. All subsequent attacks could be traced to similar encounters with this beer salesman. The patient finally acknowledged the whole story, with evident relief. Thereafter he was followed in the clinic for 6 months without further recurrences.

Comment.—All four of the foregoing patients were suffering from acute anxiety attacks. The bodily reactions were different, and they represent only some of the large number of syndromes associated with acute anxiety.

In the first patient, the bodily disturbance was an undue increase in the contractile state of the diaphragm without adequate relaxation between breaths. This is a more common manifestation of anxiety attacks than is generally recognized. The pain seems to be due to the tight contraction of the diaphragm. In some patients the attack resembles a myocardial infarction with pain in the substernal region, associated with palor, sweating and hypotension (1). In other instances, the pain is located in the right hypochondrium, and is similar to the "stitch in the side" observed in short-distance runners. The first of the above patients displayed intense anxiety during the attack, occasionally with a fear of impending death; but until treatment was undertaken, she was unaware of anxiety preceding the attack.

The anxiety attack of the second patient involved an entirely different disturbance of respiratory function, one more commonly described in textbooks—namely, hyperventilation. Talbott and his associates (2) described such a patient whose arterial $p\text{CO}_2$ reached 15.5 mm. Hg during the hyperventilation that was associated with the anxiety attack.

The third patient was clearly more neurotic than the other two, from the standpoint of background and past history. Nevertheless, she had not connected her attacks with troublesome

events in her own life situation. The nature of the bodily disturbance associated with anxiety was essentially circulatory, but the manifestation was recurrent loss of consciousness, presumably because of reduced circulation to the brain. Her episodes caused her to be referred to a neurologist.

The fourth patient had a cardiac arrhythmia which induced, not only palpitation, but on one occasion congestive heart failure and on another convulsive seizures, presumably because of cerebral ischemia.

These four patients illustrate common prototypes of the anxiety attack, but there are many other forms in which anxiety may be manifested through the organs and organ systems of man. The attacks of a particular individual are, as a rule, relatively stereotyped; but from person to person the bodily accompaniments of anxiety are legion and do not describe any characteristic pattern. They may include facial expressions of anguish, various types of vocalization, behavior changes and important changes in more recondite places, such as the viscera. Not uncommonly, one organ or organ system predominates in the manifestations of the acute anxiety attack. The respiratory and cardiovascular systems are especially likely to participate.

CARDIOVASCULAR SYNDROMES

BRADYCARDIA

Although tachycardia is popularly thought to characterize the anxiety attack, bradycardia may be the feature. Such an observation was made by Fuqua (3), who was on duty in a field hospital during the war in Korea. He was examining a marine who had symptoms of influenza; and, after listening to the breath sounds with his stethoscope, Fuqua said "Now stop breathing" as he began to listen to the heart. With that, the marine's heart suddenly stopped, and the marine fell to the floor pulseless and remained in asystole for approximately 1 minute and there was no really effective pulsation for at least 2 minutes thereafter. The doctor's request to stop breathing happened to coincide with a deafening barrage of artillery fire which burst close to the hospital tent. Further contributory evidence in human beings was

gathered by Furman (4) in the course of examining the hearts of soldiers at the time of induction into the military service. The long line of recruits came for their cardiovascular examination immediately after a blood-sampling syringe was withdrawn from their veins. He thus caught many subjects almost in the process of fainting and, indeed, caught some of them as they were keeling over and falling to the floor. Prompt examination revealed pulse rates in the low forties and blood pressures that were almost unobtainable. Recent observations of Richter (5) indicate that heart slowing as a result of vagal stimuli under circumstances of stress may be an important factor in sudden death in apparently healthy individuals because of the ultimate production of ventricular fibrillation. Richter was able to produce such vagal effects experimentally in rats by placing them in a tank of water from which they could not escape and in which they were made to swim indefinitely. Survival among these rats was greatly shortened when their orienting moustache hairs were cut off, which put them into an even more unaccustomed, "terrifying" and presumably hopeless situation. Richter further noted that wild rats did not survive this ordeal as well as did the domesticated rats who had been accustomed, over generations, to the arduous buffetings of the experimental laboratory.

TACHYCARDIAS AND ARRHYTHMIAS

It has been observed that arrhythmias, including extrasystoles, paroxysmal atrial tachycardia and atrial fibrillation, and even the more serious paroxysmal ventricular tachycardia, occur in association with troublesome events in the day-to-day experiences of individuals who have no other detectable evidence of heart disease.

Duncan and his colleagues (6) studied 15 patients who had paroxysmal atrial and nodal tachycardia and found that, although individual attacks were often precipitated by such minor events as changes in posture, there was an underlying emotional disturbance which correlated very closely with the attacks.

In another group of 12 unselected patients with extrasystoles, the life situation and emotional state of the patient appeared to be related to the occurrence of the arrhythmia in each patient

(7). Extrasystoles and associated anxiety were observed in these patients experimentally during a discussion of topics to which they were known to be sensitive, or which had previously been associated with extrasystoles. The personality structure, attitudes and general behavior of patients with extrasystoles gave evidence of a generally defensive reaction. In most of the patients, anxiety far outweighed hostility and sometimes approached abject fear. The individuals tended to be timid, indecisive and passive. They dealt with problems more often by evasion than by decisive action.

Extrasystoles were often found among patients with structural heart disease, but also in association with prolonged anxiety and an attitude of more or less frantic need for defense.

ATRIAL FIBRILLATION

This arrhythmia associated with anxiety-producing situations was studied by Stevenson, Duncan and Ripley (6) and is illustrated by the following three case histories.

CASE 5.—An attack of atrial fibrillation recorded in a man with an apparently normal heart during the stress of humiliation.

A 40-year-old man had had known hypertension and palpitation associated with attacks of paroxysmal atrial tachycardia and atrial fibrillation since the age of 34. He was born of immigrant Russian Jewish parents and brought up in poverty. The mother was the dominant member of the family; her attitude was tyrannical, and at one time she even had the patient arrested for a minor misdemeanor. He tried a number of jobs haphazardly, but throughout most of his life he had supported himself by disposing of illicit goods. At the age of 34 he was markedly obese and was found to have a blood pressure of 150/105 or higher. At about this time, he had his first episode of palpitation.

At age 36 he married a gentle girl 10 years younger than himself. At first they lived separately, she with her parents and he with his mother, whom he was afraid to tell of the marriage. When his mother ultimately forced him from her household after a quarrel, he went to live with his wife and her family. He was obliged to accept from them both financial support and humiliation. His wife proved to be, like

his mother, a domineering person, and they had frequent quarrels. He resented the patronizing attitude of her brothers and felt that his wife had not adequately protected him from the assaults of her relatives.

In this patient, overt anxiety was prominent. He expressed much of his hostility to his physicians, but it was almost impossible for him to do so in the presence of those toward whom it was directed. He had been, and was continually and fruitlessly, seeking support from his mother, wife and relatives. He resented their failure to supply it more abundantly, but he was afraid that any complaint would lead to their giving him even less.

As noted, the patient was markedly obese. His blood pressure was in the neighborhood of 160/110. Apart from the arrhythmias frequently experienced, there was little that was remarkable about the examination of the heart. A striking feature, noted in this and many of the other subjects of this group, was moderate sinus tachycardia.

He visited the laboratory one day following a painfully humiliating experience at the hands of his brother-in-law. He had, as usual, restrained himself from speaking, but he noted the sudden onset of palpitation after the episode. Electrocardiographic tracings revealed atrial fibrillation. As he was urged to discuss the events leading to the attack, he became more tense. He began to weep and sob, expressing mixed feelings of resentment and depression, and numerous ventricular extrasystoles appeared, 24 occurring in 24 seconds. The extrasystoles persisted throughout the sobbing but disappeared completely when he had relaxed. The basic rhythm of atrial fibrillation continued throughout, and the ventricular rate of 164 beats per minute remained unaltered during the period of observation. The following day the cardiac rhythm was normal.

CASE 6.—Atrial fibrillation experimentally induced by a stressful interview with a young woman who had had hyperthyroidism.

A 34-year-old housewife complained of palpitation. She had not felt close to either parent, although she had felt more attached to her mother than to her father, a quick-tempered butcher. The first 10 years of the patient's life were spent in Rumania, from 1909 to 1919. She recalled the unsettled conditions there during that time, the famines and the invasion by the Germans, with their foraging and raiding for food.

The patient described herself as "always nervous, even as a child."

Her husband said, "She has always been sensitive as long as I have known her, and that's since she was about 15. She was always bashful and also very willful and hard to manage." In youth she had had a goiter, which became prominent when she was about 19 years of age. When she was 24, she married. Her anxiety continued throughout these years and gradually was blended into the full picture of hyperthyroidism. This was characterized first by amenorrhea, vomiting, diarrhea and an increase in general nervousness. Later, after the onset of exophthalmos, paroxysmal attacks of palpitation with dyspnea began.

A basal metabolic rate of plus 42 was found. After subtotal thyroidectomy, the patient "felt like a new person" for about a year. Then her brother entered the Army and her sister-in-law was obliged to work. Care of their three children devolved on the patient who, once again, began to have frequent attacks of palpitation.

After about a year, a second thyroidectomy was performed, but she continued to be tense and anxious and to suffer from episodes of paroxysmal atrial fibrillation, many episodes being observed in the clinic. They occurred about twice a month in settings of tension and fatigue.

She was extremely meticulous about the care of her house, quick tempered and slept poorly. "People annoy me. I don't know why. Even if I go to the theater and someone chews gum, I could scream. If things don't go my way right away, I scream." She had difficulty with decisions. She was reserved and tense during interviews and, when asked to relax, became more tense. Even when given 0.4 Gm. of sodium amytal intravenously, she remained completely alert; and she said later that she had been afraid "to let go," in case she might say things she did not want to say.

Her chief anxiety was her health. She was particularly concerned about excessive menstrual bleeding, which had been attributed to the presence of uterine fibroids. Her grandmother had died of cancer, and she visualized a similar end for herself.

Examination revealed no enlargement of the heart, and there were no murmurs. The blood pressure was 120/80. The heart rate was usually accelerated, almost invariably above 80 and more often around 100. X-ray examination of the chest revealed no unusual cardiac configuration. The electrocardiogram, besides showing the tachycardia, revealed the P-R interval prolonged to 0.21 second and a negative T wave in lead CF. The basal metabolic rate was not elevated at this time.

The patient was interviewed while electrocardiograms were being made. Initially, she was extremely tense and anxious and there was

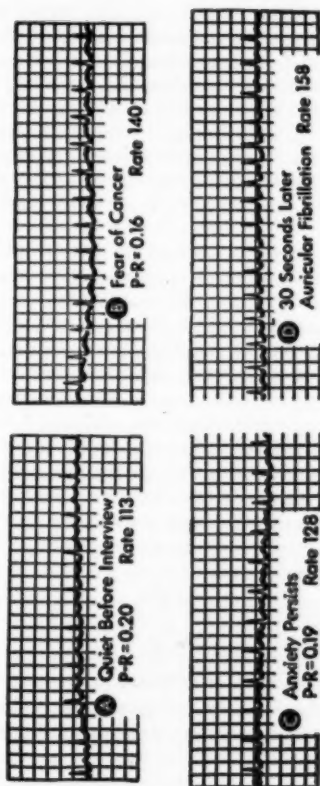


FIG. 1.—Depression of the S-T segment followed by the appearance of atrial fibrillation during a stressful interview (lead II).

sinus tachycardia with a ventricular rate of 113. The P-R interval was 0.20 second (Fig. 1.) The patient's health was then discussed with her. As she described her worries over her health, she became even more anxious. She spoke of fear that her menorrhagia was due to cancer. As she said this, she became more agitated and began to weep. The heart rate rose to 140 and then fell again to 128. She continued to be anxious, and a tracing taken 30 seconds later showed the presence of atrial

fibrillation with a ventricular rate of 158. This arrhythmia persisted throughout the remainder of the interview, during which the patient was strongly reassured and urged to relax. She did not become aware of palpitation herself until after she had left the clinic. The attack stopped the following morning, after she had given herself quinidine.

Following the foregoing observations, she was seen several times in the outpatient department. She entered a period of relative calm in her life and for $3\frac{1}{2}$ months had no further attacks. Her heart rate was noted to be slower. She said: "Maybe I am more contented and at ease."

During this period a hysterectomy was performed, which had previously been deferred because of her arrhythmias. At the same time, her husband had a minor operation. Shortly thereafter they were forced to move out of their apartment. These circumstances brought back the patient's anxiety, and attacks of atrial fibrillation recurred. As before, fatigue and stressful situations were the commonest precipitating factors. Thus, one episode of arrhythmia came on after a visit to the gynecology clinic, during which some misunderstood remarks of the physician filled her with anxiety. Another occurred when she was asked if her husband would come to the clinic to discuss her illness with the physicians. She interpreted this to indicate a forthcoming revelation of bad news, and again with anxiety developed atrial fibrillation.

Comment.—A prolonged P-R interval preceding the development of the arrhythmia has been frequently observed in patients who change from regular sinus rhythm to atrial fibrillation (8). This has been considered evidence of vagal activity, but it could also be the result of other factors influencing the conductivity of the heart. The attack of atrial fibrillation in this patient occurred after the height of the emotional response (as judged by other criteria) and when the heart was slowing and presumably receiving more vagal impulses.

CASE 7.—Attacks of ventricular tachycardia occurring in association with stressful events in a confused and insecure young man.

A 34-year-old maker of orthopedic appliances was referred to the New York Hospital in November 1952 because of paroxysmal tachycardia.

He had been in good health until June 1945, when he experienced an abrupt onset of rapid heart action, accompanied by a sense of constriction in the chest and throat, which ceased abruptly in about

10 minutes. Over the next 5 years, until September 1950, he had about 30 attacks, lasting from a few minutes to 2 days. During the attacks, distress was only moderate; and between the attacks he felt well, although he experienced occasional extrasystoles. An electrocardiogram taken during an attack in September 1948 showed ventricular tachycardia. Between September 1950 and March 1952 he had no cardiac symptoms. Brief attacks occurred in March and April 1952. A 10-day attack in July 1952, with the symptoms and signs of congestive failure, led to his hospitalization at another institution. An electrocardiogram showed ventricular tachycardia, which reverted to normal rhythm after the administration of procaine amide intravenously. His course was complicated by pulmonary infarction. Two shorter attacks of ventricular tachycardia (confirmed by electrocardiogram) were treated with intravenous procaine amide in August and November 1952. He was referred to the New York Hospital for further evaluation. At that time, his physical examination, electrocardiogram and x-ray were normal.

The patient was born in a small city in southern Germany, the only child of upper lower-class parents. He described both parents as kind, just and considerate, but cold and undemonstrative. He characterized his early training as "typically German." Although neither parent used physical punishment, he always assumed that the wishes of either parent were to be obeyed without question. From the time of his earliest memories he was extremely neat, compliant and sweet tempered. He does not recall having fought with anyone—"I'm a good guy. I never wished anybody any harm."

When the patient was 5 years old, his parents decided to seek new economic opportunities in the United States. They left him with his grandparents and came to this country. When he was 10, he joined them here; and he remained in this country, attending school until he was 19. He did moderately well in school, enjoyed meeting people and participated actively in sports, excelling in aggressive sports. He made acquaintances easily but had few close friends. When he was 19, he visited his grandparents in Germany and decided to stay on to complete his secondary schooling. After completing his schooling, he entered a manufacturing firm in Germany as a member of the accountancy staff. He did well at his work and enjoyed life in Germany. The hours were good and there was promise of steady advancement; also, there was considerable security and opportunity for recreation, including a soccer field and team maintained by the company. He was sympathetic to the Nazi movement, although it is not known whether or not he joined the party. He resolved to spend the rest of his life in Germany.

In 1939 he was drafted into the German army. He became a non-commissioned officer in an artillery signal battalion and served on the western and eastern fronts. During the Russian campaign, he was sentenced to 5 weeks in a labor battalion in Poland for having said that he wished he were back in the United States. During his army service he married a German girl, and he had two children by her. He was captured by the Americans shortly before the German collapse. Since he spoke English fluently, he served as an interpreter, and he succeeded in obtaining some favors for his fellow prisoners. He met one American soldier who had been a schoolmate in New York. His fellow prisoners continued to regard him as a good German soldier, and so he received severe treatment from his captors. He was surprised and angered that he should be treated as a hated enemy. His weight dropped to 100 pounds. He had had little enthusiasm for the German campaign in the west but had been convinced that the German campaign in Russia was in a just and righteous cause. He could not understand why the Western Allies had not joined Germany in this war against Russia. While still in prison camp, a few days after he had learned that the Russians had occupied eastern Germany and that large segments of eastern Germany would be ceded to Poland, he developed his first attack of tachycardia. Soon after this, he was released from prison and returned to western Germany to join his family. After a brief period of serving as interpreter for the Allied Occupation Forces, he went into the wholesale textile merchandising business with his father-in-law.

Over the following years the business did increasingly well, and the attacks of tachycardia decreased in frequency until they ceased in 1950. Although the economic situation of his family was better than that of most families, he became convinced that his children would be better off if they were raised in the United States. His parents urged him to come, and they assured him that there would be good job opportunities here. In December 1951 he brought the family to this country.

Things did not go as well as he had expected. Living conditions with his parents were crowded; and before he could afford it, he was forced to find an apartment for his family. The only job he could obtain was in a small firm which made orthopedic appliances. His duties included opening the mail and doing relatively unskilled work in connection with the manufacturing. There were several American veterans working closely with him, and there was a good deal of "kidding" about the war and his role in it. The patient became moody and depressed, convinced that he had made a mistake in returning to this country. The

attacks of tachycardia returned. Because of his absences from work, his wife was forced to go to work as a cleaning woman. His illness served to deepen his feelings of failure, hopelessness and despair. He was too proud to accept public assistance. "What would people say? 'These krauts shoot at us and then come over here and take our money.'"

The patient was agitated, depressed, and discouraged and on the verge of tears. His manner toward the examiner was smiling, self-deprecatory, co-operative to the point of servility and never directly hostile. Hostility toward the examiner was expressed largely in terms of criticism of any plan of therapy, disbelief in its possible efficacy and criticism of other physicians. During interviews there was great motor activity—pounding of the table, pounding his fists into his hands, swinging his head from side to side, pacing the room and rubbing his face with his hands. At first he denied anger over his present situation. Later he indulged in violent outbursts of anger directed toward his wife "If things keep up this way, I'll eventually go crazy. That thought is getting stronger and stronger. When I'm convinced of it, I'll really go crazy. I might kill someone then."

Any discussion of the treatment he received in the prison camp or of his feelings about America and Americans caused intense flushing of the face and ears. At the end of one such discussion he stated: "I'm all worked up to a pitch. I don't feel good. If I stay this way for a week or so, I get an attack." On one occasion, during such a discussion, the patient got up abruptly and left the room.

Although the patient was probably quite aware of the connection between his feeling states and the attacks, he frequently refused to come to the clinic, giving as an excuse his need to work whenever possible.

Since July 1952 he had been receiving prophylactic procaine amide orally, and before coming to the clinic he had developed two attacks while receiving the drug. Although there was little evidence of progress in the therapeutic situation, he was free of attacks for the next 6 months. In July 1953 a veteran who had recently come into his firm was promoted despite the patient's seniority. The patient promptly quit his job because of this supposed injustice. His wife and his parents criticized him for this action. Unable to find another satisfactory job, he had two attacks of ventricular tachycardia in July, necessitating hospitalization in another institution, and he developed another attack in August 1953 while waiting to be seen in the clinic. He was promptly

hospitalized. The electrocardiogram (Fig. 2) showed ventricular tachycardia. After approximately 2 Gm. of procaine amide intravenously, the rhythm reverted to normal, but there was inversion of T waves in the precordial leads. Temperature, sedimentation rate and white blood count remained within normal limits, and the electrocardiogram tracing

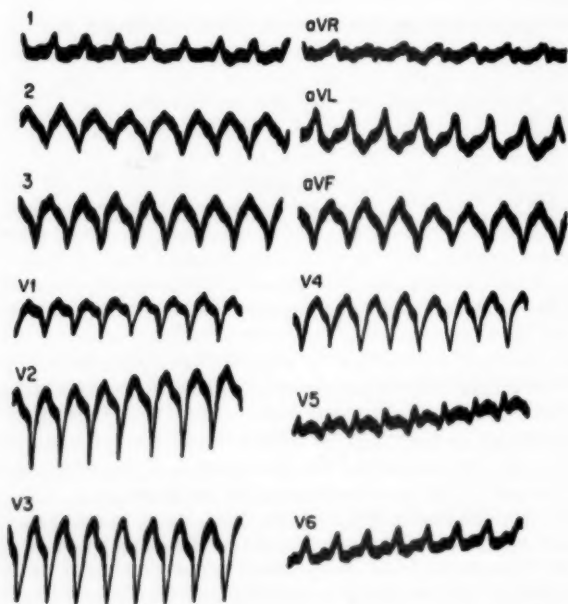


FIG. 2.—Ventricular tachycardia accompanying emotional conflict with anxiety in a patient with no other evidence of heart disease.

rapidly returned to normal. His enforced stay in the hospital was used as an opportunity to emphasize the necessity for his accepting community help. Through the efforts of the social service worker a job with adequate salary, offering on-the-job training as a machinist, was procured. Oral quinidine was substituted for procaine amide as a prophylactic measure, and he was discharged with the advice to work up to 8 hours daily at sedentary work.

Thereafter he remained free of attacks. At present his outlook is optimistic. He feels that he and his family will be able to adjust adequately to life in this country and that his decision to come to the United States was a wise one.

CHANGES IN HEMODYNAMICS

CASE 8.—A man with manifestations of neurocirculatory asthenia whose periodic acute attacks of palpitation were associated with a decrease in exercise tolerance and in cardiac stroke volume.

A 44-year-old steamfitter's helper came to the hospital for treatment of repeated episodes of palpitation which had occurred during the previous 3 years. There was usually associated anxiety and muscle tension, but there was no dyspnea.

The patient was the second child of an Irish Catholic family in which there were 7 siblings. In childhood and youth there had been considerable rivalry between the patient and his elder brother. The patient was particularly close to his father, a fireman, who was killed accidentally when the patient was in his twenties. His mother died when he was 14. In youth and early adulthood the patient was casual and irresponsible, sexually promiscuous and without goals. He was generally passive and lacked initiative at work. He became a steamfitter in his early twenties; but, although he stayed in this trade for over 20 years, he never became a master steamfitter, insisting that he was unequal to this responsibility and could not organize the work.

In his middle thirties he became acquainted with a Protestant girl who had already been married twice and who was separated from her second husband. As their friendship increased, they drifted into a common-law marriage; and when the patient was 38, a child was born. Since his "wife" was still undivorced, the threat of social censure was added to the burden of his new responsibilities. Nevertheless, he felt unequal to the commitment of a formal marriage even when his partner finally obtained a divorce. In this setting, the patient had a number of acute respiratory infections, became impotent and began to have palpitation. These episodes continued until he came to the clinic 3 years later.

The patient's heart rate was invariably rapid during early visits, the highest rate recorded being 128 beats per minute. It slowed to 80 or 90 beats after he had opportunities to discuss his troubles and after reassurance from his physician. The blood pressure was 160/100 at the first visit but later fell to 120/80. Physical, electrocardiographic and radiologic examinations of the heart were entirely normal.

The patient was a timid, shy person who avoided the eyes of his interviewer; only with effort, did he talk of his own feelings. Anxiety was always prominent, and he was largely preoccupied with gloomy forebodings of the future. He was frightened about his heart and was very dependent in his relationships with his wife and physician. Any strange

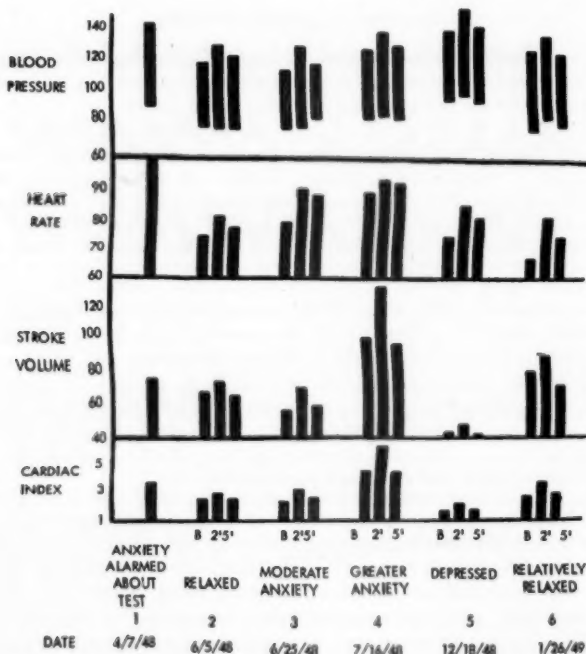


FIG. 3.—Changes in exercise tolerance in association with anxiety.

situation, such as an application for a new job or a temporary separation from his wife, threatened his security and evoked marked anxiety and palpitation.

He was studied over a period of 18 months, during which time close attention was paid to the occurrence of symptoms and signs of effort intolerance.

His cardiac output and other circulatory measurements for six representative occasions are shown in Figure 3. On April 7, 1948 (exercise not recorded), he was unusually anxious because of the presence in the room of another doctor, which he interpreted as a sign of the gravity of his illness. The cardiac index was 3.7, derived from a heart rate of 101 with a comparatively small stroke volume (70 cc.). On June 5, after changing jobs, he was cheerful and relaxed; the cardiac index was appreciably lower (2.5), and the exercise tolerance was normal. Three weeks later his wife announced the forthcoming vacations for herself and their daughter, and he began to feel "jittery." On June 25 there was little change in cardiac output, but the heart rate was higher and the stroke volume somewhat less than on June 5. Three weeks after this, on July 16, his family had actually left and he had had a recurrence of anxiety and palpitations. On this occasion the resting cardiac index (4.6), stroke volume and heart rate were all increased and exercise tolerance was impaired. On December 18, he was unemployed, Christmas was approaching, and the prospects were gloomy. He had felt depressed and "down in the dumps" all week. The cardiac index before (1.6) and after exercise was lower on this occasion than on any other day. On January 26, 1949, he was still unemployed; but, although somewhat depressed, he had no anxiety and entertained some hopes of employment. The heart rate was 67; and the increased cardiac output on this day, compared to the previous one, was due to a higher stroke volume.

INVOLVEMENT OF OTHER ORGAN SYSTEMS

Although it is clear that cardiovascular disturbances of various sorts often characterize acute anxiety attacks, respiratory manifestations may dominate the picture. The most dramatic respiratory syndromes are diaphragmatic spasm (hypoventilation), on the one hand, and hyperventilation, on the other, as described in Cases 1 and 2. Kidney and bladder disturbances also occur frequently. Schottstaedt and his associates (9, 10) showed that polyuria is a frequent accompaniment of acute anxiety with agitation, while retention of salt and water characterizes situations which arouse tension or depression.

Hinkle and his associates (11) observed a several-fold increase in urinary excretion in association with anxiety or alarming situations. Experimental observations were carried out on healthy subjects. The subjects came to the laboratory after an overnight

fast, having ingested no fluids since the previous evening. After the subject voided, prior to the experimental session, observations were made during three periods of 1 hour each. During the first hour, the subject was lightly diverted and engaged in neutral conversation. During the second, an attempt was made to arouse significant anxiety in the subject, and during the third an attempt was made to reassure the patient. An example of the findings is cited in the following case:

CASE 9.—Several-fold increase in urinary output associated with apprehension and anxiety.

The subject was a 42-year-old businesswoman, a divorcee. During the first hours she settled herself comfortably and talked in a friendly and ostensibly calm manner about minor experiences of the day. At the beginning of the second hour, however, an obturator needle was inserted into her vein, and small samples of blood were withdrawn periodically as part of another study. "What are you doing?" she said, with obvious alarm. Thereupon she was engaged in a discussion of the frustrations in her job and of her resentment toward her mother, whom she was required to support. Throughout the discussion during the middle hour, her anxiety and apprehension persisted; and as she watched the periodic blood-drawing procedure, she asked "When do I get a transfusion?" During the third and reassuring hour, she was quiet and seemed somewhat depressed. During the control period of the first hour, this patient's urinary output had been less than $\frac{1}{2}$ cc. per minute. During the period of most intense anxiety, however, urine volume rose to the neighborhood of 3 cc. per minute, to fall again during the third hour to $\frac{1}{2}$ cc. per minute.

Comment.—Wide variations in the volume of urine excreted may be attributable either to alterations in renal function, bladder function or a combination of the two. Both acute retention and urinary frequency have been encountered under circumstances of acute anxiety (12, 13).

CASE 10.—Atony of the bladder during recurrent anxiety-producing situations and demonstrated experimentally during cystometry.

A 22-year-old Virginia farm boy, a seaman first-class on a Navy troopship, complained of intermittent urinary retention over the previous 3-4 months. He was admitted to the urologic service of the Ninth General Hospital in New Guinea. Hearty and friendly of manner, he

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appeared superficially well adjusted. Although the period of his symptoms corresponded in point of time to a tour of duty in enemy waters, where his ship was subjected to suicide bombing by Japanese kamikaze pilots, he denied anxiety and said that he was looking forward to getting back to his ship with his buddies. At the time he was seen, he had not voided for 24 hours. For the previous 5 days, it had been necessary to catheterize him twice a day. Careful examination had revealed the presence, above the symphysis, of a palpable bladder, which dribbled intermittently. The urine was normal, and the upper urinary tract appeared normal on intravenous pyelography. Cystoscopy showed the mucosa to be of normal appearance, bladder capacity increased, and the bladder neck relaxed. Perception of pain and temperature discrimination appeared reduced. Cystometry yielded a tabetic or atonic type curve.

Since no cause for his disability had been uncovered, the patient was interviewed under sodium amytal on the suspicion that the bladder disturbance might constitute part of a reaction to his precarious life situation in combat.

Immediately after intravenous injection of 0.5 Gm. of sodium amytal, he spontaneously voided 1,100 cc. His manner changed abruptly. He lost his bland self-confidence and became tense and slightly dejected. He was surprised and slightly puzzled over his ability to void. When the difficulty was formulated to him on the basis of unconscious emotional conflict, he said that he suspected that, and that it had always been impossible for him to void when anyone was around during his childhood. During his youth, he had had difficulty meeting the sexual demands of his girl friends, and this difficulty had persisted into married life. He later noted difficulty in voiding after intercourse. He accepted the likelihood that the present episode was related to his fear of sailing into enemy waters and being subjected to Japanese suicide bombers, although he said: "I know I ought to be with the rest of them. I am no better than anyone, and I am anxious to do my part."

Comment.—This patient was considered to have a hysterical type of psychoneurosis, manifested by emotional detachment and loss of bodily function—in this instance, bladder contractility rather than the usual blindness, aphonia, paralysis of extremities or anesthetics. He was removed to the psychiatric service, where he was treated for 2 weeks with repeated injections of sodium amytal, reassurance and occupational therapy. He required no further catheterization. Finally his bladder function returned to normal, and he was discharged to duty in a noncombat area.

CASE 11.—Urinary frequency and urgency associated with recurrent anxiety with bladder hyperfunction documented experimentally in the laboratory.

A 35-year-old housewife came to the hospital because of recurrent headaches (of both muscle-tension and vascular varieties) for 8 years and because of urinary urgency and frequency off and on for the preceding 10 years. She was a meticulously dressed, quiet spoken, unimaginative, somewhat rigid person, who seldom displayed her feelings. Her parents were reared in Italy, coming to the United States shortly after their marriage. They gave little warmth or support to their children and imposed narrow restrictions on their activities. The patient had met these frustrations by suppressing her feelings. She found difficulty in expressing in words her feelings about herself, her family and her married life.

She had married at the age of 21, after having had few opportunities to go out with men. She was ignorant of sexual matters at the time of her marriage; and, although she felt little gratification in sexual intercourse, she denied any conflict. Her husband was described as a "nervous" person who had migraine and a peptic ulcer. Shortly after her marriage she became pregnant. She said that she desired a child but did not want to be burdened with the responsibility so early in her marriage. Following her first delivery, which she considered difficult, she wanted no further pregnancies. This brought her into conflict with her husband, who wanted more children, and with her religion, which forbade contraception. Her urgency and frequency began just about the time her child was born. Urination occurred every 30 minutes to an hour and, at first, was associated with nocturia two or three times a night. The nocturia subsided after a few years. She had few outside interests apart from her son, on whom she became very dependent, and she could not bring herself to send him to a summer camp.

The patient was co-operative but tense. After catheterization and emptying her bladder, 200 cc. of water were instilled. Her urinary urgency and frequency were discussed; and, as she began to talk about these conditions, the bladder pressure gradually rose. She then began to discuss the quarrels with her husband and their financial problems, and bladder contractions became stronger and more frequent. Finally, she complained of severe urgency. At this point, the examiner left her to prepare an injection of sodium amytal. The urgency persisted until she caught sight of the syringe containing sodium amytal, which she had been told would relieve her urgency. Promptly, the contractile state of the bladder decreased sharply, and she said she felt at ease and

had no more urgency. Sodium amytal, 0.25 Gm., was injected intravenously, nevertheless, and she was asked to discuss her troubles. She spoke of meeting the payments on the home and new car, and of her anxiety about her son and also her husband, who was going into his own business. As she spoke of these problems, she again appeared ill at ease and tense. There was a concomitant reappearance of bladder contractions and a gradual rise in intravesical pressure, and urgency returned. The injection of sodium amytal was resumed until she had received 0.4 Gm. She soon began to feel relaxed and secure again, and the intracystic pressure fell. It remained below 5 cm. of water for approximately $\frac{1}{2}$ hour, although at the end of that time there was over 700 cc. of fluid in her bladder.

Comment.—The above case illustrates a reaction pattern of the bladder accompanying anxiety and resentment in association with a discussion of adverse life situations. Sodium amytal was effective in bringing about relaxation of the bladder only when it was followed by a general attitude of relaxation and security. In other patients in this group, similar reactions were noted.

Cases 9, 10 and 11 illustrate features of the acute anxiety attack which are less alarming than many cardiac and respiratory changes but which may occur even more commonly. Thus, in a group of soldiers from a unit of aviation engineers studied in the Southwest Pacific area during World War II, urinary frequency and nocturia were by far the commonest symptoms related to their unduly prolonged tour of duty in the jungles of New Guinea. Insomnia and nightmares were next in frequency.

The gastrointestinal tract, once considered the seat of the soul, is also by no means immune from involvement during circumstances which may arouse anxiety in the human subject. Diarrhea is the most common manifestation. Sometimes it may be intense and long lasting, especially if the patient lacks an awareness of the pertinent troublesome situation. The skin, too, shares in many patterns of reaction to anxiety-producing situations. Pallor and flushing are the most common, but a variety of patterned disturbances, including hives and eczema, have been observed and recorded (14, 15).

DIAGNOSIS OF ACUTE ANXIETY ATTACKS

The diagnosis of anxiety attacks is not always easy. Such attacks occur more frequently in women than in men, and most frequently in the third, fourth and fifth decades. Fear is usually, but not necessarily, a prominent manifestation. The symptoms may be confused with a variety of other clinical conditions, including Graves' disease and various types of cardiovascular and pulmonary disturbances, as well as neuromuscular disorders. The commonest symptoms are palpitation and chest pain, dyspnea, pain in the abdomen, tremulousness, tingling in the extremities and urinary frequency; they may occur at any time of day and last a matter of seconds, minutes or hours. There is no combination of signs and symptoms which establishes the diagnosis of an anxiety attack; neither is there a laboratory test which is of use in a positive way. The diagnosis is usually made by a shrewd assessment of the circumstances surrounding an attack in the light of some knowledge of the personality, goals, attitudes and vulnerabilities of the patient. Such information is usually adduced through a painstaking history of the patient and also through interviews with members of the patient's family.

When the patient is aware of being anxious but when the reason for anxiety is obscure to him, the term "free floating anxiety" is often applied. Under such circumstances the patient is tormented by a feeling of uneasiness and apprehension. There may be associated sleeplessness and some of the more obvious bodily manifestations of anxiety, including sweating, tremulousness and palpitation. Well-defined episodes of this sort describe a certain type of acute anxiety attack. Other types of anxiety attacks are unaccompanied by any awareness of anxiety before the attack. During the attack, however, there is usually some anxiety, often amounting to *angor animi*, or fear of impending death. An awareness of anxiety before or even during the attack is by no means essential to the diagnosis, however. *In fact, the awareness may be suppressed more often than not.* For this reason, there could not be general agreement among psychiatrists as to what distinguishes an acute anxiety attack from an acute episode of conversion hysteria. Anxiety, overt or implicit, is a feature of most neurotic patterns. The terms "hysteria" or "conversion re-

action" are ordinarily invoked when there is a relatively large degree of repression of the patient's awareness of his problems and conflicts, and also when the bodily or behavioral pattern that characterizes the attack seems to satisfy a special need or accomplish an unconscious purpose. Thus, a sudden loss of voice in a singer or a public speaker might fit the designation of a hysterical conversion reaction. On the other hand, temporary aphonia is a common feature of the anxiety attack. Perhaps the distinction is not particularly useful in the present treatise.

For present purposes, the anxiety attack might be thought of as an acute, short-lived and usually alarming episode set off by an emotionally charged situation, the significance of which the patient may or may not appreciate. Thus, a wide variety of bodily reactions may come under the category of the anxiety attack. Clinically the important thing is to recognize the attack for what it is and to satisfy one's self that some other disease with similar or almost identical manifestations is not present. Bradycardia may result from carotid sinus sensitivity or from conduction defects in the heart. Similarly, tachycardias and arrhythmias may be the consequence of myocardial damage from atherosclerosis and other processes. Tetany may be a manifestation of hypocalcemia or metabolic alkalosis; and other bodily manifestations, as well, may be set in motion by stimuli of a concrete nature. *Anxiety attacks are set off by stimuli that are essentially symbolic, circumstances which owe their force not to their intrinsic quality but to their meaning.*

In the evaluation of the evidence available in the diagnostic survey, it is important to remember that the presence of so-called organic disease does not protect against the development of symptoms which are in reality the manifestations of anxiety but which might be attributed to the structural disorders present. The following two cases, which are briefly described, illustrate such circumstances (16).

CASE 12.—*Palpitation and dyspnea on exertion present in a young woman with mitral stenosis whose hemodynamic disturbance was related mainly to anxiety.*

A 32-year-old housewife of Italian extraction came to the clinic with the complaints of dyspnea, palpitation, pain in the back of the neck and dizziness.

The patient was the fifth of 6 children, the third of 3 daughters. Her delivery was difficult and she was described as blue and stuporous for 2 days. Her father was drunk at the time and, when told of her birth, said that he wanted a boy. Her childhood was passed in circumstances of poverty, made worse by the frequent quarrels between her mother and father. Her mother was a hard-working, kindly and rather timid person. She was completely dominated by her husband, who was strict, abusive and often drunk. In childhood the patient had many illnesses. She was timid and backward socially at school. In her late teens she had her first date, and a friendship developed rapidly until her father expressed disapproval of her boy friend and she was obliged to drop him. A little later she became friendly with another man, but this time she met the opposition of his family. After a lengthy courtship she finally married this man only to find that he closely resembled her father. In addition, her husband was dominated by his mother, who remained cool toward the patient. Sexual relations were unsatisfactory.

The patient became pregnant 2 years after her marriage. During the pregnancy her husband became neglectful of her and her father became ill, finally becoming an invalid. At prenatal physical examination, the patient was found to have definite evidence of mitral stenosis and insufficiency. She was examined frequently and was advised against excessive exertion. At this time she first noted palpitation and dyspnea on exertion. Delivery was uneventful, but the symptoms persisted as her marriage gradually deteriorated. Her husband stayed out late at night and showed little interest in her, but he insisted on her making ritualistic visits to his family. He spent little time with their boy but freely offered strict injunctions about his upbringing. The child became restless and anxious and soon was a serious disciplinary problem. The patient was unable to protest against her husband's behavior. Resentment against her father for siding with her husband accumulated, culminating in her wishing her father dead. Not long after this, her father died; this happened shortly after she had seen him without speaking to him. On the day of the funeral, she had an acute anxiety attack with severe palpitation and dyspnea. She continued to have these symptoms episodically accompanied by dizziness and by pain in the left chest and the back of the neck. Palpitation and dyspnea were exacerbated by exertion but occurred, with the other symptoms, also at rest. She also had fears of dying and of insanity. The symptoms continued and became worse during the 8 months following her father's death, and they finally brought her to the clinic.

Physical examination revealed an enlarged heart with the characteristic murmurs of mitral stenosis and insufficiency. The rhythm was regular, and the blood pressure was 118/70. There was no evidence of congestive failure or other physical abnormalities. An x-ray film of the

chest confirmed the enlargement of the heart. The electrocardiogram was normal.

The patient exhibited marked anxiety with dry mouth, cracked voice, many tense, restless movements and difficulty in expressing her feelings. She hesitated and stammered, and often her speech was blocked completely. Hostile feelings were largely hidden and rarely verbalized. She was troubled by a number of obsessive ideas (such as the need to memorize license plates and to read a newspaper completely) and by compulsive behavior (chiefly with respect to attendance at church and performance of housework).

On the occasion of her first visit (Nov. 3, 1948), exercise tolerance was tested. The test itself frightened her, despite attempts at reassurance. She said afterward that she was afraid someone was going to anesthetize her suddenly. At rest the heart rate was 100 and the cardiac index 4.6. Response to the exercise was grossly abnormal. Three months later (Feb. 9, 1949) she was again tested, having in the meantime visited the clinic once a week and there ventilated her feelings and discussed her problems. On this occasion, she was more relaxed and had fewer symptoms. The resting heart rate was 90 and the cardiac index 3.8. Exercise tolerance was less impaired. Some weeks later she had a partial relapse and exacerbation of symptoms after a quarrel with her husband, who had refused to take her out. When she was tested 3 days after this incident, while still in this relapse (Mar. 2, 1949), her resting heart rate was 82, but there was an increase in stroke volume and the cardiac index was 3.9. Exercise tolerance was impaired when compared to the previous test. Still later, after further interviews, her symptoms left her completely despite unchanged conditions at home. On April 27, 1949, the heart rate before exercise was 75 and the cardiac index 3.4. She performed the exercise with only slight dyspnea, and there was further improvement in exercise tolerance. The remaining impairment was presumably that due to rheumatic heart disease.

CASE 13.—*Palpitation and dyspnea associated with impaired exercise tolerance and attributable to anxiety-producing situations in a young woman with a patent ductus arteriosus.*

A 24-year-old secretary of Italian extraction came to the clinic with the chief complaints of palpitation, dyspnea and weakness, which occurred at rest but more severely on exertion. At times she felt pains in her left chest and in her legs. The symptoms had been present for 2½ years, had recently become worse and had resulted in a diminution in her physical activities.

The patient's father was a humble butcher who worked hard but made little money. He was strict, although devoted to his family. He

was described as "very emotional" and was frequently in tears. Her mother was also kindly but was a driving, perfectionistic hard-working woman who worked at a job herself to supplement the family income. The patient was the youngest of 5 siblings.

When she was a few weeks old, a heart murmur was discovered. Her mother reacted to this information by becoming overprotective; she frequently listened to the girl's heart by putting her ear to the chest wall. She restricted the child's activities, telling her not to roller skate or skip rope and giving other precautionary advice. In childhood the patient was easily frightened and had some enuresis. On one occasion, when she was 11, she stayed out late, playing, and was the object of a neighborhood hunt. When she was found, she felt extremely guilty for the trouble she had caused. That night, while feeling tense, she masturbated for the first time. She continued to do this for some years thereafter, but always with intense guilt and anxiety afterward. She received no information on sexual activities from her parents.

At school she did exceptionally well, graduating from high school at 15. Her first serious acquaintanceship with a boy ended in his jilting her; after this she was depressed and lonely for a year and withdrew from social activities. She went to college for 2 years and at first did well; but as her depression lifted and she increased her social activities, she neglected her studies. Realizing this too late, she began to study long hours and became unusually tired. At this time she became introspective about her heart, began to count her pulse, and wondered if she would die suddenly. In this setting, her physical symptoms began. As they continued, she left college and rested at home. After some months of this program she felt better and returned to work. Then she underwent another disappointment with a man and had a return of symptoms, which gradually increased in severity until her first visit to the clinic. In addition, she became aware of feelings of anxiety and irritability. She found her home more crowded than it had been, although there had been little change in the membership. Her work became increasingly tedious.

Physical examination of the patient showed a thin active girl of less than average stature. The heart was found to be markedly enlarged to the left at the base. There was a forcible systolic thrust of the heart over all the precordium and a systolic thrill in the pulmonic area. Over the entire precordium there was a loud (grade IV) systolic murmur, and in the pulmonic area there was a somewhat less loud diastolic murmur. The pulmonic sounds were much louder than the aortic sounds. The heart rate was 106, and there was regular sinus rhythm. The blood pressure was 114/84. The palms were wet, and she wore the facial aspect of anxiety. In other respects the physical examination revealed no abnormalities. The electrocardiogram showed right-axis

deviation with abnormally large P_2 and P_3 waves. X-ray of the chest and fluoroscopy showed enlargement of the pulmonary artery. Angiocardiography revealed a patent ductus arteriosus without other abnormalities.

The patient's anxiety permitted her to give her history only with great effort. She tried to unburden herself but was afraid of her own feelings, releasing them slowly. She rarely expressed hostility.

The first test, performed at her first visit to the clinic in February during a period of marked anxiety, showed a resting heart rate of 99 and a cardiac index of 8.1. The response to exercise was so impaired that the values are not given for any period preceding the 7 minutes after exercise, which was the earliest that satisfactory measurements could be made. Throughout the next 4 months, she came to the clinic on four other occasions and was tested on two of these. During this period she gradually became more relaxed as she discussed her emotional development, unburdened herself of guilt-laden thoughts, such as those concerning masturbation, and received reassurance and explanations about her condition, including the relative importance of congenital heart disease and emotional stress in producing her symptoms. She showed decreasing anxiety and symptoms and increased her social and physical activities. In April, 2 months after her first test, the resting heart rate was 95 and the cardiac index 6.3. Two months later (June) the resting heart rate was 91 and the cardiac index 6.3, and there was improvement in exercise tolerance. She then left the clinic, but returned for a follow-up visit 6 months later (December) and was tested again. At this time she was free of all symptoms except mild dyspnea on exertion; she could, however, climb two flights of stairs without discomfort. She was relaxed and cheerful and considered herself entirely well. The resting heart rate was 88 and the cardiac index was only 4.0. The exercise test was performed with noticeably less discomfort than on any previous test. There was considerable further improvement, although some residual impairment, in exercise tolerance.

Comment.—In this patient and in the preceding one (Case 12) some impairment of exercise tolerance persisted when the patients were relatively relaxed. A fraction of the original impairment of exercise tolerance might be ascribed to the structural heart disease; the remainder was presumably a manifestation of anxiety.

PATHOGENESIS OF THE ANXIETY ATTACK

A great deal of confusion has resulted from the widely held concept that emotions cause bodily reactions. The confusion is

further compounded by the difficulty of defining an emotion and, therefore, the different way in which the term is used by various writers. Literally, the term implies movement of some sort. Thus, an emotion is clearly a manifestation, not a cause. On the other hand, many authors equate the term with a feeling state. To them an emotion is a sort of sensation, or at least an awareness, which may be pleasant or unpleasant; joy, satisfaction, hope and appetite fall into the category of emotions. Here, again, emotions are the *result* of some circumstance which is pleasing, frightening or frustrating, not the cause. Finally, some workers apply the term emotion to unconscious mental processes. The emphasis is on the significance of an event to an individual in view of his personality make-up and past experience; presumably, neural connections are made because of the significance but without the process being brought to awareness. To such a view, the emotion would be an essential part of the neural integrative activity and thus part of the mechanism of formulating a response, but certainly not the cause. An emotion, therefore, may be looked on variously as a repressed but still functioning aspect of the interpretation of a life experience, as a feeling state occurring because of the conscious or unconscious interpretation of a life experience or, finally, as originally used to define a manifestation or part of the reaction pattern aroused as a consequence of the interpretation of a life experience. In no instance would the emotion logically qualify as a cause. Therefore, it would be well to abandon the confusing concept that emotions cause bodily changes.

Why some patients manifest an anxiety attack in one way and others present with entirely different visceral and behavioral patterns is still obscure. The explanation may lie in the person's genetic equipment, his personality development and past conditioning experiences. There may be other contributing factors as well. The job of the physician is to assess the suspected life experience of the patient, not in view of his own attitudes and values, but in a light of what he knows of his patients. Thus the significance, conscious or unconscious, may be detected and the bodily reaction understood to some extent.

It is important to bear in mind that the manifestations of an anxiety attack cannot be reproduced by the stimulation of any

particular nerve or set of nerves or by the injection into the body of any particular pharmacodynamic agent. Certain features of the anxiety attack of a particular individual may be reproduced—but, to recapitulate a point made earlier, the changes which accompany anxiety may involve virtually the whole gamut of reaction patterns of bodily tissues.

MANAGEMENT OF THE ANXIETY ATTACK AND TREATMENT OF THE PATIENT

The anxiety attack is essentially a transitory phenomenon; hence, it is generally benign and well tolerated by the healthy human being. Sudden anxiety manifestations may occur, however, in those with serious mental and emotional illnesses. When they do, the patient requires the attention of a psychiatrist, often very promptly. In order to expedite referral to a psychiatrist, the general physician or internist must be prepared to recognize especially the signs which may herald a sudden devastating homosexual panic, the disorganization of thought characteristic of a catatonic schizophrenic episode or perhaps an impulsive suicidal attempt in a patient with an agitated depression. In all of these potentially serious conditions, severe anxiety may provide the prodrome. The identification of these conditions is not always easy. It is well to take a cautious approach and to have a high index of suspicion. A knowledge of the patient and his past experience and temperament are particularly helpful; the carefully taken history is most important.

When the physician has satisfied himself that neither pain, panic, disorganization nor serious depression are imminent, and if the patient is one who habitually represses his problems and conflicts, intravenous administration of sodium amytal may be helpful in stimulating recall or even in having the patient relive the pertinent noxious situation. An example of such an experience occurred in a 26-year-old sergeant observed in the Southwest Pacific Theater during World War II. His symptom of persistent pain in the right flank had resisted all manner of diagnostic procedures. He was a strapping, friendly young man who did not appear tense or anxious in the least; but because of the suspicion that his pain might be a manifestation of an anxiety attack, he was given sodium amytal intravenously. Within a few

seconds the young man's manner changed entirely. He appeared grim and silent momentarily and then burst into tears, sobbing and shouting that he had "let his buddies down." He had been in charge of a patrol which became isolated by enemy gunfire. He had ordered his men to stay under cover until nearly nightfall, and then he attempted a break-through to his own lines in a direction which he considered safe. The sortie was discovered and, although the patient got through safely, there were heavy losses among his patrol. Thereafter he blamed himself for a serious error in judgment. He remained in the headquarters area for 2 weeks until replacements could be made in his platoon. It was when he was sent forward with his men again that he developed the severe flank pain which prevented him from walking and carrying his equipment as the situation required. The pain had persisted until the amytal interview.

During the period of his uncontrollable weeping in the interview, the pain was worse than ever; but after he had unburdened himself of his guilty feelings, the pain subsided for the remainder of the day. The following morning the pain was present again, but mild. The physician talked with him again, this time without amytal, encouraging him to recall what he had said on the previous day and what had occurred in the forward area. At first he was unable to do so; but after considerable conversation in a permissive and reassuring vein, he referred obliquely to his experience with the patrol and said that he was eager to get back with his men as soon as his physical condition permitted. On subsequent interviews over the next 3 days he was able to develop further insight and to accept his action as one of the exigencies of war without the degree of guilt which he had had and which he had repressed. After a month in a rehabilitation area, he was returned to duty, and he remained asymptomatic thereafter. He returned to work with the headquarters battalion, however, and did not do further patrol duty.

Treatment of anxiety attacks, when they are finally recognized as such, is usually successful and gratifying to the physician. A reassuring attitude on the part of the physician and allowing the patient to talk freely about his difficulties often, in themselves, effect a cure. Sometimes talking can be facilitated by repeated small doses of sodium amytal administered intravenously in the

physician's office and followed by an hour-long opportunity for free expression on the part of the patient. Explanation of the physiologic mechanisms behind the alarming symptoms is also usually helpful and may break the vicious cycle of anxiety which results from apprehension about the possibly grave nature of the symptoms themselves. In those patients who are inclined to repress their emotional conflicts, a more painstaking and time-consuming approach is usually indicated. This may require great patience and forbearance on the part of the physician; but his sustained attitude of interest, solicitude and respect for the patient usually rewards him with a favorable outcome. The patient's lack of awareness of any accompanying stressful events may make treatment particularly difficult at times. It is usually wise for the physician to be patient and attentive, avoiding pressing his patient toward a recognition of his problems. It should be borne in mind that the patient suffering from anxiety attacks is suffering. The suffering may be greatly aggravated if the physician, unable to make out any abnormalities on physical or laboratory examination, tells the patient there is nothing wrong. He or she knows there must be something wrong, and so there develops a vicious cycle set off by anxiety secondary to the fact that the original anxiety attack remains unexplained. After several experiences of this sort with physicians, the therapeutic problem becomes much more difficult, since the patient finds himself unable to believe what he hears.

Whether or not to refer a patient to a psychiatrist depends as much on the physician and his aptitudes as it does on the nature of the patient's illness. It takes time to treat anxiety attacks properly. If the physician is unable to devote time to periodic therapeutic interviews with the patient, he should certainly refer the patient to someone else, but not necessarily to a psychiatrist. Those with anxiety attacks are usually concerned about the bodily manifestations. Unless the physician is willing to make periodic physical examinations, a very important source of therapeutic reassurance may be neglected. Very often the negative physical examination, if interpreted properly to the patient, has a positive therapeutic effect.

The treatment of the patient with manifestations of acute anxiety, like any other medical challenge, requires skill and understanding. The physician's interest in and liking for his fellow

man and his faith in him become powerful tools. They are used best with gentleness and warmth but without becoming personally identified with the patient or his problems.

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